

AIR FORCE RESEARCH LABORATORY



Aircraft Maintenance Intuitive Troubleshooting (AMIT) Presentation/Briefing

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November 2005

Interim Report for October 2003 to November 2005

*Approved for public release;
distribution is unlimited.*

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14. ABSTRACT The goal of Aircraft Maintenance Intuitive Troubleshooting (AMIT) is to create job-aiding software, compatible with existing computer systems that will tell maintenance technicians what is really wrong with aircraft faster and more accurately than ever before.					
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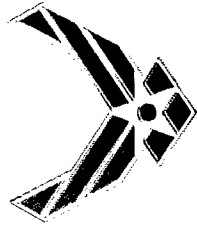
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AIRCRAFT MAINTENANCE INTUITIVE TROUBLESHOOTING (AMIT)

November 2005



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Program Manager
Human Effectiveness Directorate
Air Force Research Laboratory

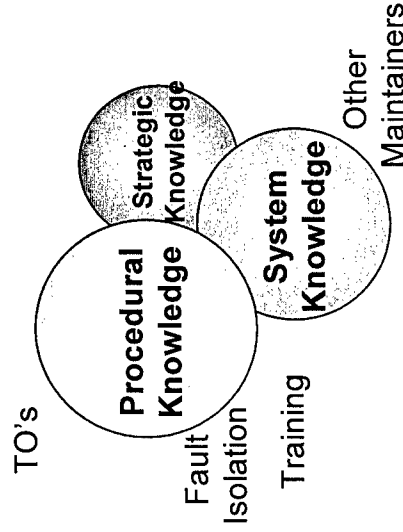


AMIT Program Description

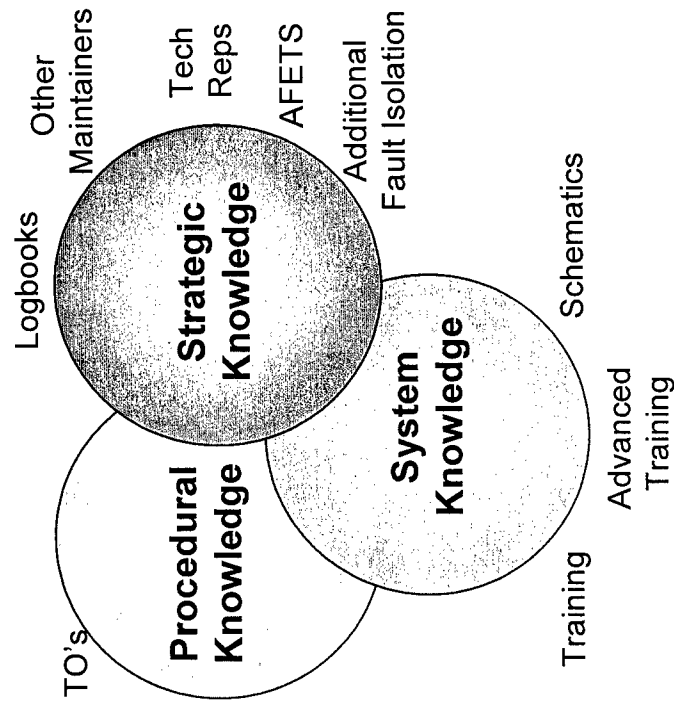


- Three year Air Force Research Laboratory Proof of Concept Demonstration
- Program Goal: Reduce aircraft downtime by improving human performance in maintenance troubleshooting of complex aircraft system discrepancies

Novice Knowledge Base



Expert Knowledge Base





AMIT Program Objectives



- Improve expert performance by providing immediate access to task-relevant knowledge
 - Contrasted by currently fragmented processes
 - Historical info, tech orders, logbooks, collaboration
- Improve novice performance by accelerating development of expert mental models and strategies
 - Logical, task-specific knowledge presentation
 - Access to expert sources of knowledge
- Decrease troubleshooting task times, error rates
- Design AMIT proof-of-concept to GCSS-AF and eLog21 objectives/vision

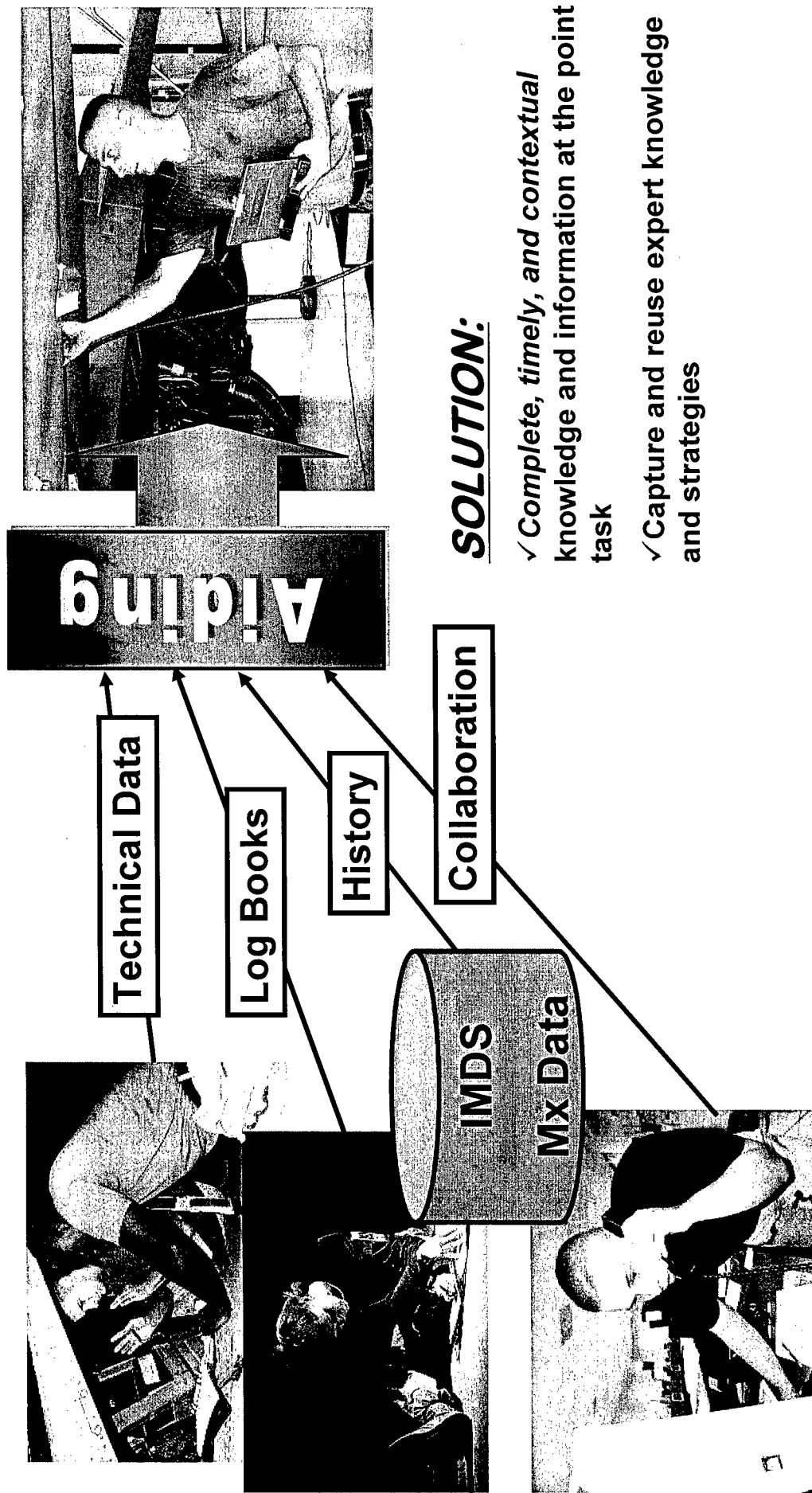


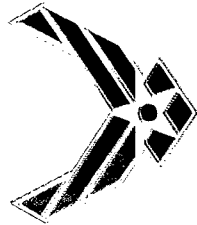
AMIT Vision



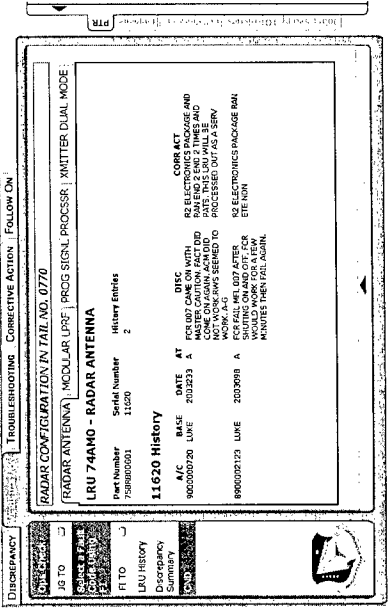
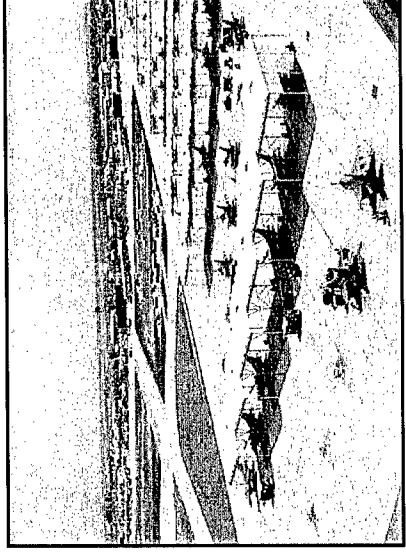
TODAY

TOMORROW

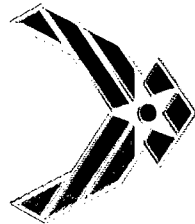




Program Approach

Year 1	Year 2	Year 3
<p>Expert Knowledge Base</p> <p>TO's Logbooks Other Maintainers</p> <p>Tech Reps AFETS</p> <p>Strategic Knowledge</p> <p>Procedural Knowledge</p> <p>System Knowledge</p> <p>Additional Fault Isolation Schematics</p> <p>Training Advanced Training</p>		
<ul style="list-style-type: none"> • Problem Space Definition • Cognitive Model Definition • Gap Analysis • Opportunity Identification • CONOPS Development • Preliminary Research 	<ul style="list-style-type: none"> • Science Exploration • Technology Demos • Solution Integration • Lab Tests • Field Test Planning • Obtain R&D Sponsors • AMUG & CRB Reviews 	<ul style="list-style-type: none"> • Field Test to Measure Troubleshooting Performance • Transition Support • Final Report

Technology Improvements Serving Maintenance Excellence



AMIT User Interface



Process Step Tabs

Corrective Action - Microsoft Internet Explorer

Address: [z:\Technical\Screen Design\amit_live\chpnav_tab1nav_tab2b.html]

Back Forward Stop Search Favorites Go Links

DISCREPANCY TROUBLESHOOTING CORRECTIVE ACTION FOLLOW ON

Ops Check
JG TO
Select a Fault Code Using
FI TO
LRU History
Discrepancy Summary
END (Reserved)

WEAPONS SYSTEM FAULT DETECTION PROCEDURE

NOTE
All steps in this procedure shall be performed on the left MFD. Unless otherwise specified, all results will be observed on the left MFD.

1. Depress and release OSS 14 adjacent to highlighted box on lower left of MFD.
RESULT: FI Display B - PASSED
ELSE: 0474BA

2. Depress and release OSS adjacent to TEST
RESULT: FI Display C - PASSED
ELSE: 0474BA

3. Record fault indications listed on Maintenance Fault List (MFL).
RESULT: FI Display D - PASSED
ELSE: 0474BA

4. Depress and release OSS adjacent to CLR

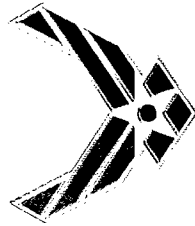
Weapons System Fault Detection Procedure

Add logbook entry regarding action taken
Go Cancel

Information Access Tabs
Jobs, Setup, TO, History, Collaboration, Logbook, PTR

Data Links

Prompt for Knowledge Capture



Progress to Date

Context Filtering of Knowledge



- Filtered by MX process step
- Filtered by WUC

Corrective Action - Microsoft Internet Explorer

File Edit View Favorites Tools Help

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Back Forward Stop Search Favorites Go Links

DISCREPANCY TROUBLESHOOTING CORRECTIVE ACTION FOLLOW ON

Ops Check
JG TO
Select a Fault Code Using
FI TO
LRU History
Discrepancy Summary
END
(Reserved)

WEAPONS SYSTEM FAULT DETECTION PROCEDURE

NOTE
All steps in this procedure shall be performed on the left AFD. Unless otherwise specified, all results will be observed on the left AFD.

1. Depress and release OSS 14 adjacent to rightmost test on lower edge of AFD.
RESULT: If Display B - PASSED
ELSE - 94745BA

2. Depress and release OSS adjacent to TEST.
RESULT: If Display C - PASSED
ELSE - 94745BA

3. Record fault indications listed on Maintenance Fault List (MFL).
RESULT: If Display D - PASSED
ELSE - 94745BA

4. Depress and release OSS adjacent to CLP.

Weapons System Fault Detection Procedure

UPL 1470 4 004

Local Intranet

Done

Procedural Knowledge



Progress to Date

Efficient Information on Demand

- Search engine in background
- Eliminate multiple manual queries

DISCREPANCY

Ops Check
JG TO
Select a Fault
Code Using
FL
FL TO
LRU History
Discrepancy
Summary
END

TRAUBLESHOOTING

CORRECTIVE ACTION

FOLLOW ON

RADAR CONFIGURATION IN TAIL NO. 0770

RADAR ANTENNA
MODULAR LPRF
PROG SIGNAL PROCSSR
XMITTER DUAL MODE

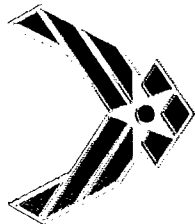
LRU 74AM0 - RADAR ANTENNA

Part Number	Serial Number	History Entries
758R800G01	11620	2

11620 History

A/C	BASE	DATE	AT	DISC	CORR ACT
9000000720	LUKE	2003233	A	FCR 007 CAME ON WITH MASTER CAUTION. FACT DID COME ON AGAIN. ACM DID NOT WORK. RWS SEEMED TO WORK. A-G	R2 ELECTRONICS PACKAGE AND RAN END 2 END 2 TIMES AND PATS. THIS LRU WILL BE PROCESSED OUT AS A SERV
8900002123	LUKE	2003098	A	FCR FAIL MFL 007 AFTER SHUTTING ON AND OFF. FCR WOULD WORK FOR A FEW MINUTES THEN FAIL AGAIN.	R2 ELECTRONICS PACKAGE RAN ETE NDN

System Knowledge



Progress to Date

Knowledge-centric Approach

- Problem Tracking to Resolution Tool
- Capture strategic knowledge

DISCREPANCY

VERIFICATION

TROUBLESHOOTING

CORRECTIVE ACTION

Inspection (Resolved)

Follow-On Maintenance (Resolved)

Review & Closeout (Resolved)

Review Log/PTR

Review Job

PTR

Jobs Setup

History

Collaboration

Logbook

PTR for 0770 -- JCN 20051550401

(FV) (FI) (CA) (RV)

1 → 2 → 3 → 4 → 5 → 6 → 7

DISCREPANCY CORRECTIVE ACTION

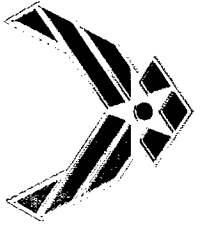
The aircrew reports MFL112 with False targets. Replaced PSP and wrote up A/C for In-Flight Check.

Process Steps Completed

Process	Procedures	Results	Decisions	Comment No.
FV	FCR Ops Check	PASS	FC 9461XG, 9461AR	1
FI	9461AR			2
FI	9461XG			
FV	IA-to-A Checkout	Pass with False Targets	Perform IA-to-A Check 9461XG	4
FI	9461XG		PSP	
CA	Remove PSP, Install PSP			6
RV	FCR Ops Check	PASS		7

Comments

Strategic Knowledge



AMIT Benefits



• Maintainer Benefits

- Reduced preparation time
- More first-time success repairs
- Accelerated knowledge & skill progression

• Stakeholder Benefits

- More productive workforce
- Reduced parts usage
- Higher aircraft availability

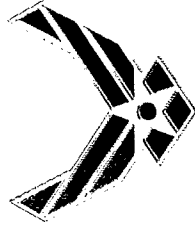


AMIT Transition Strategy

Joint Capability Technology Demonstration



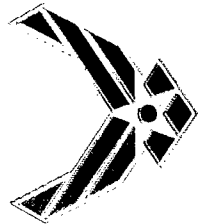
- Proposed JCTD with ACC and JFCOM in FY07 & 08
- Leverage laboratory investment (end in FY06)
- Prototype development and warfighter assessments
- Allow decision makers to fully understand operational potential before a full up acquisition
- Funding
 - FY07 – OSD 100%
 - FY08 – ACC 70%, OSD 30%
- Potential partners
 - US Navy (F/A-18)
 - Predator
 - European Participating Air Force (EPAF) – F-16 (22 countries)



Sponsorship Summary



Nov 04	F16 Management Directorate, OO-ALC (508 FSG)	Tentative sponsorship, pending Air Staff ILI/ILM concurrence
Dec 04	AF/ILMM	Agreed to staff MOU
Dec 04	ACC/DRA	Agreed to sponsor AMIT for ATC
Dec 04	AETC/DOZ/XPT/XPL, 82 nd Trng Wing/CV and Group/CC	Agreed to explore AMIT as a integral part of the Integrated Learning Environment Strategy
Feb 05	AF/ILMM	Suggested Briefing AMIT at AFM/MAG
Mar 05	ACC/DRA16	Suggested Briefing AMIT at F-16 IPMR
Mar 05	JFCOM/J8 and CLF/N43	Engaged in preliminary discussions
Apr 05	F-16 SG, 508 FSG	Briefed AMIT at F-16 IPMR
Jun 05	AF/ILM	Agreed to include AMIT in MX Portfolio
Jun 05	SAF/XCIO (AF IPT)	Presented AMIT as ACTD FY07 candidate
Aug 05	19AF/LG	Support Program and Field Test
Aug 05	ACC/DRA	Agreed to FY08 POM Requirement
Sep 05	56MXG	Agreed to host AMIT Field Test at Luke AFB
Oct 05	JFCOM/J8	AMIT in Top Three JCTD candidates FY07



Questions?

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